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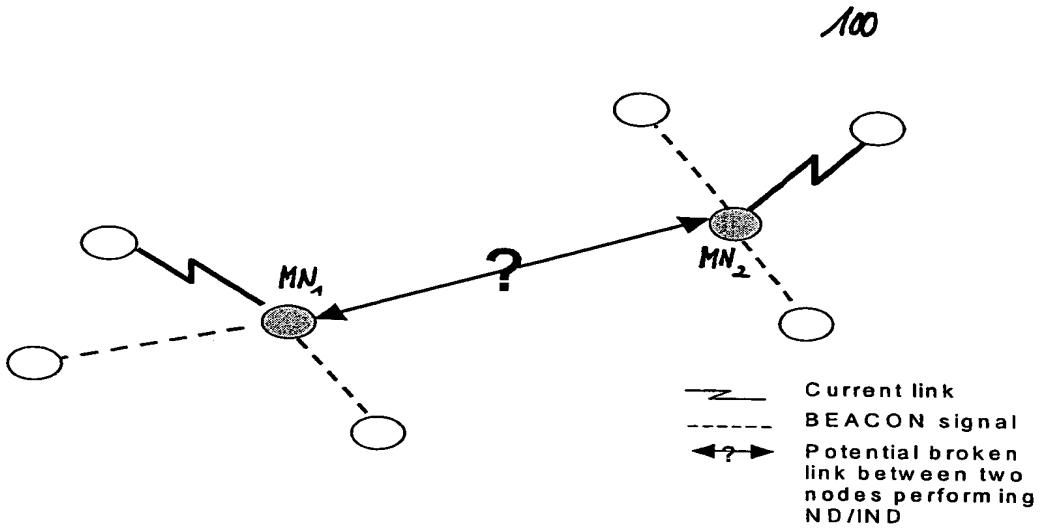
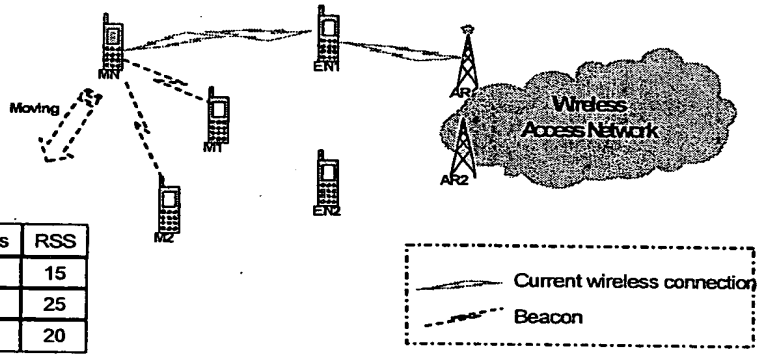

100
MN1
?
MN2
Current link
BEACON signal
Potential broken link between two nodes performing ND/IND

Fig. 1

200



MAC Address	RSS
EN1	15
M1	25
M2	20

Fig. 2

300

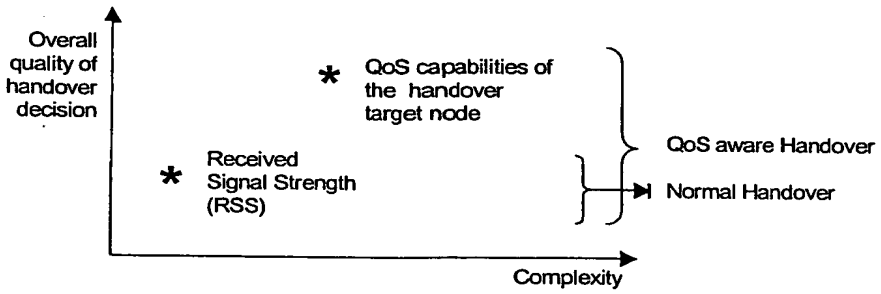

Overall quality of handover decision
QoS capabilities of the handover target node
Received Signal Strength (RSS)
QoS aware Handover
Normal Handover
Complexity

Fig. 3

400

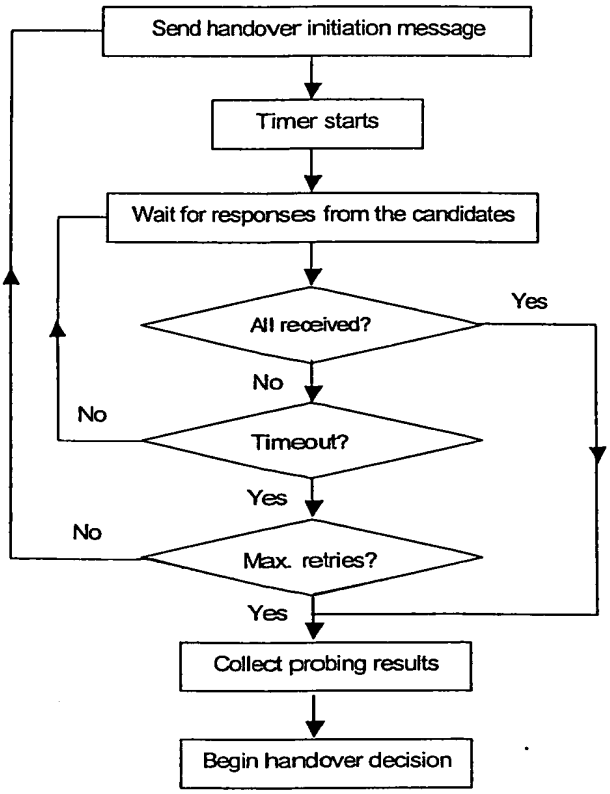

Send handover initiation message
Timer starts
Wait for responses from the candidates
All received?
Yes
No
No
Timeout?
Yes
No
Max. retries?
Yes
Collect probing results
Begin handover decision

Fig. 4

500

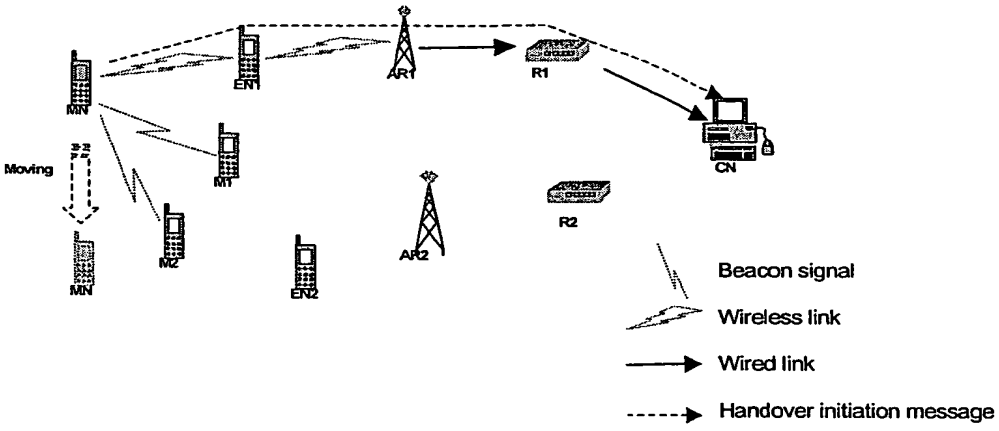

MN
EN1
AR1
R1
CN
Moving
MN
NM1
NM2
EN2
AR2
R2
Beacon signal
Wireless link
Wired link
Handover initiation message

Fig. 5

600

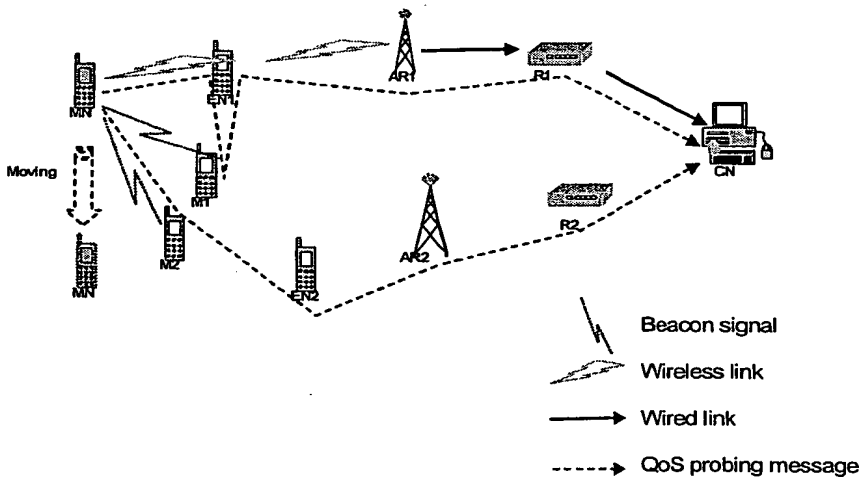

Moving
MN
ER1
AR1
R1
CN
MN
MR
ER2
AR2
R2
Beacon signal
Wireless link
Wired link
QoS probing message

Fig. 6

700

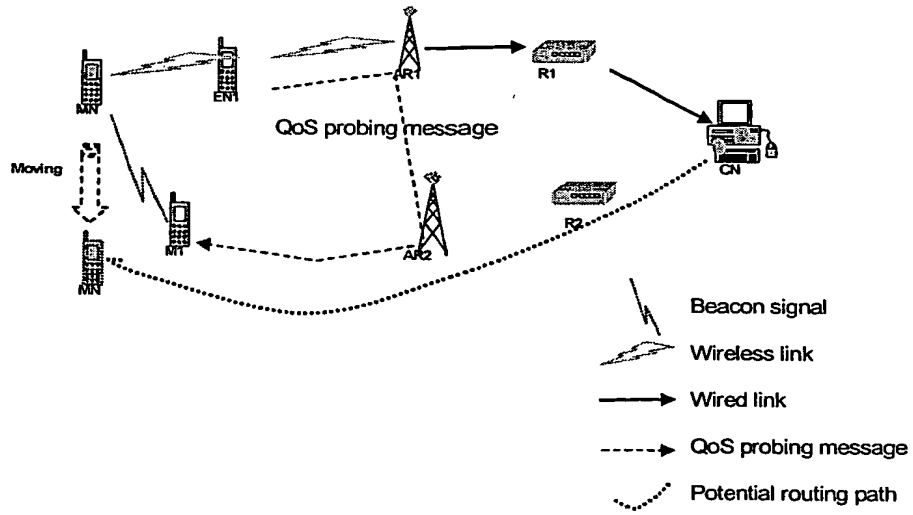

MN
EN1
AR1
R1
QoS probing message
CN
Moving
MN
EN1
AR2
R2
MN
Beacon signal
Wireless link
Wired link
QoS probing message
Potential routing path

Fig. 7

800

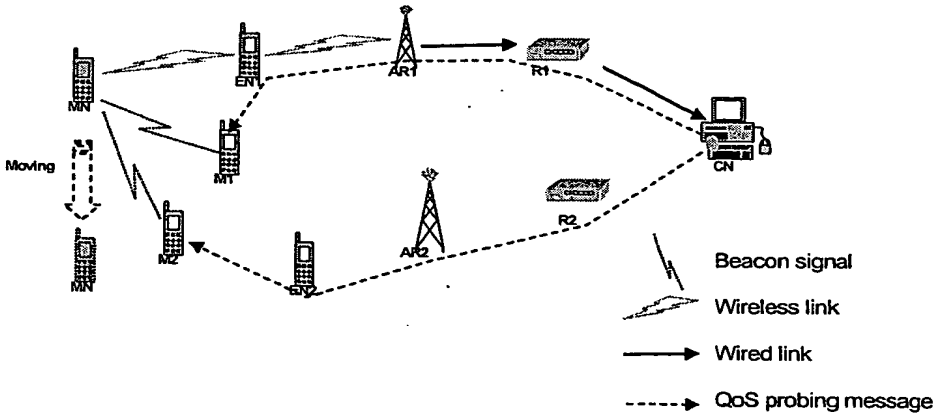

MN
Moving
MN
EN1
AR1
R1
CN
MT
R2
AR2
Beacon signal
Wireless link
Wired link
QoS probing message

Fig. 8

300

Flow Label	Source Address	Neighbor Address	Max. BW	Min. BW	HR	SR	Timer	Indicator

Flow ID | Path History | Required QoS | Monitored QoS

Fig. 9

1000

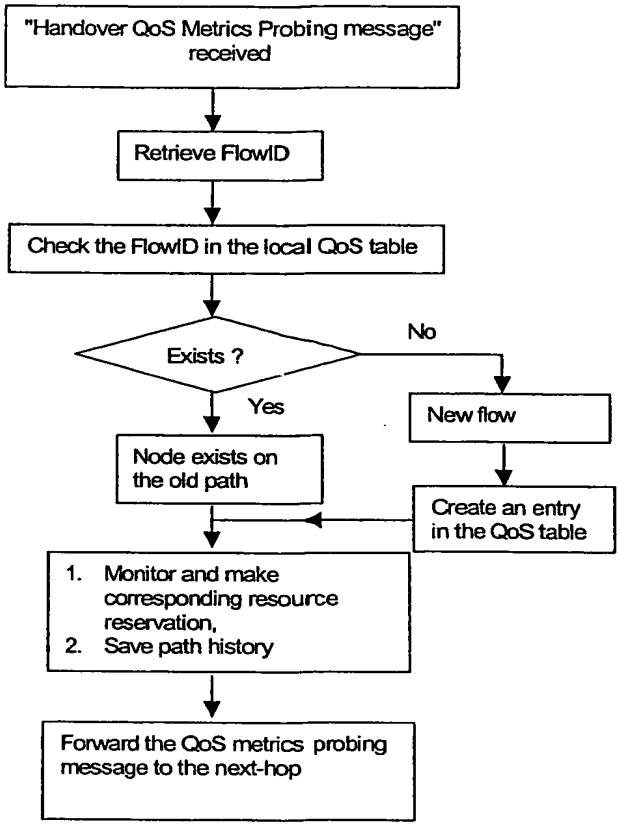

"Handover QoS Metrics Probing message" received
Retrieve FlowID
Check the FlowID in the local QoS table
Exists ?
No
Yes
New flow
Node exists on the old path
Create an entry in the QoS table
1. Monitor and make corresponding resource reservation,
2. Save path history
Forward the QoS metrics probing message to the next-hop

Fig. 10

1100

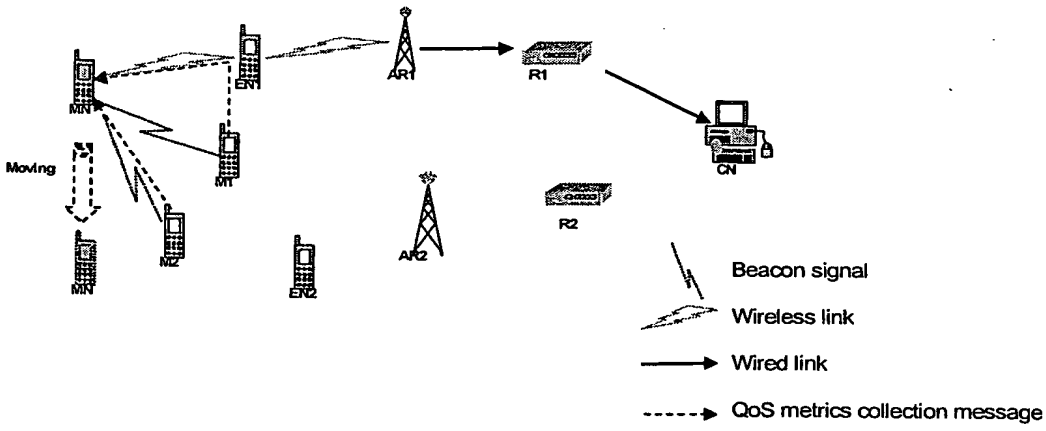

MN1
2N1
AR1
R1
CN
Moving
MN
MN2
2N2
AR2
R2
Beacon signal
Wireless link
Wired link
QoS metrics collection message

Fig. 11

1200

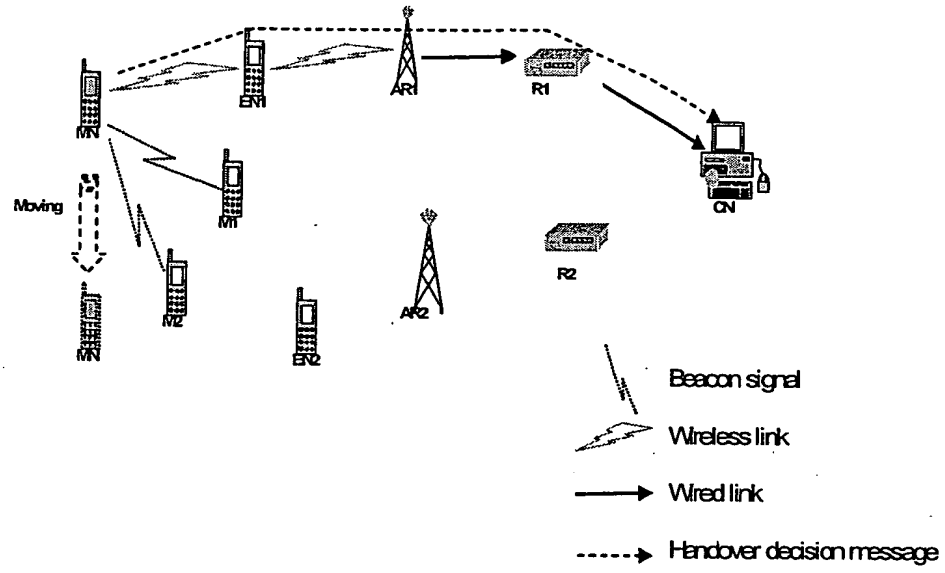

MN
CN1
AR1
R1
CN
Moving
MN
MN
AR2
R2
BR2
Beacon signal
Wireless link
Wired link
Handover decision message

Fig. 12

1300

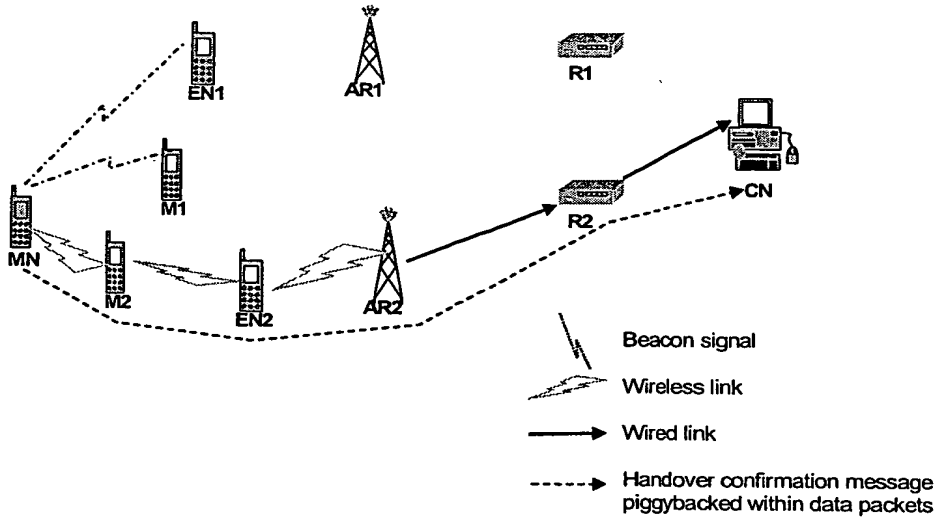

EN1
AR1
R1
M1
MN
M2
EN2
AR2
R2
CN
Beacon signal
Wireless link
Wired link
Handover confirmation message
piggybacked within data packets

Fig. 13

1400

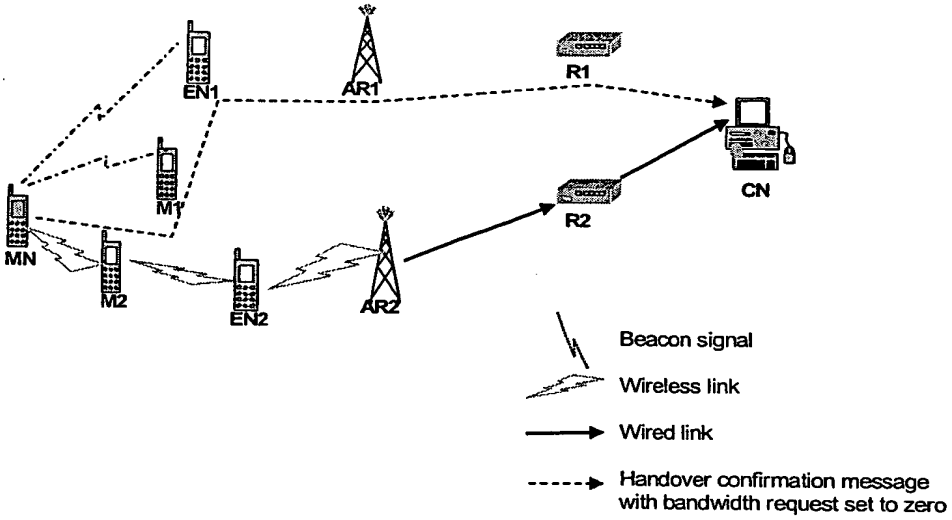

EN1
AR1
R1
M1
CN
MN
R2
M2
EN2
AR2
Beacon signal
Wireless link
Wired link
Handover confirmation message
with bandwidth request set to zero

Fig. 14

1500

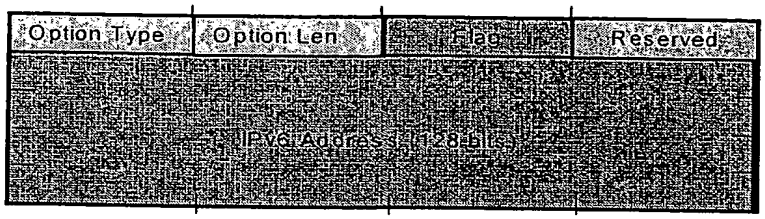


Fig. 15

1600

Fig. 16

1700

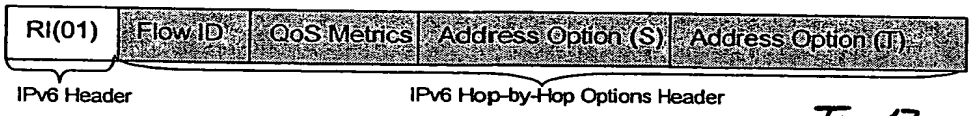


Fig. 17

1800

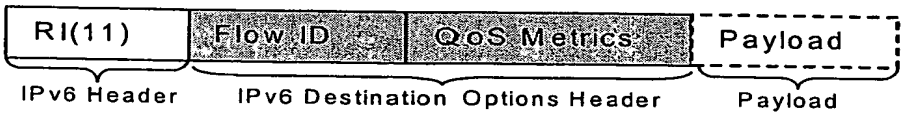


Fig. 18

1900

Fig. 19

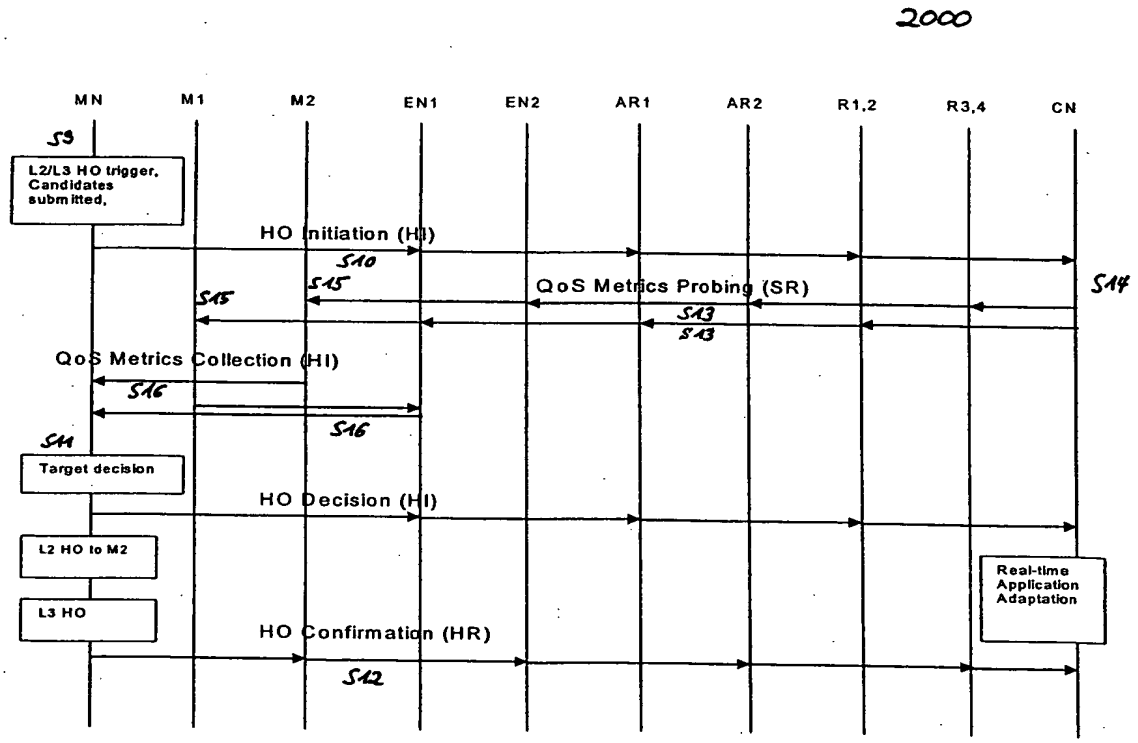

2000
MN
M1
M2
EN1
EN2
AR1
AR2
R1,2
R3,4
CN
S9
L2/L3 HO trigger, Candidates submitted,
HO Initiation (HI)
S10
S15
QoS Metrics Probing (SR)
S14
S15
S13
S13
QoS Metrics Collection (HI)
S16
S16
S11
Target decision
HO Decision (HI)
L2 HO to M2
Real-time Application Adaptation
L3 HO
HO Confirmation (HR)
S12

Fig. 20

2100

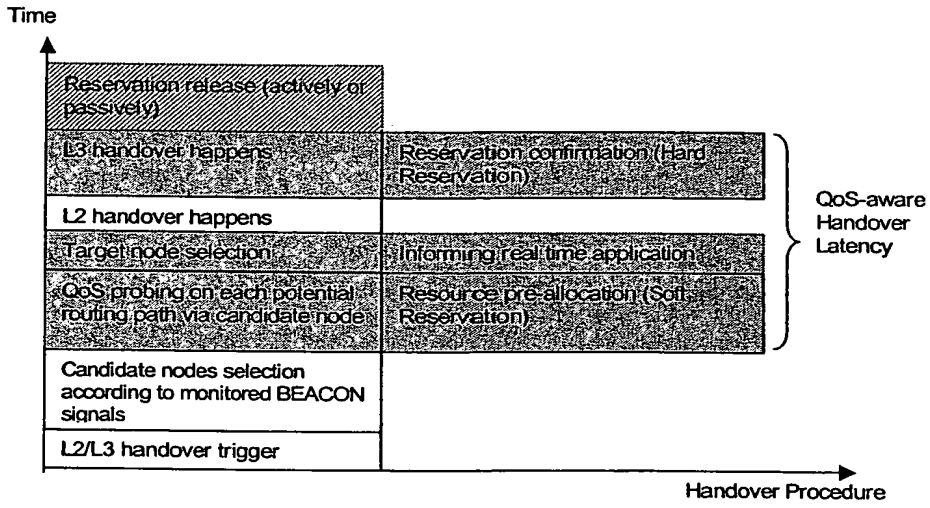

Time
Reservation release (actively or passively)
L3 handover happens
Reservation confirmation (Hard Reservation)
L2 handover happens
Target node selection
Informing real time application
QoS probing on each potential routing path via candidate node
Resource pre-allocation (Soft Reservation)
Candidate nodes selection according to monitored BEACON signals
L2/L3 handover trigger
QoS-aware Handover Latency
Handover Procedure

Fig. 21

2200

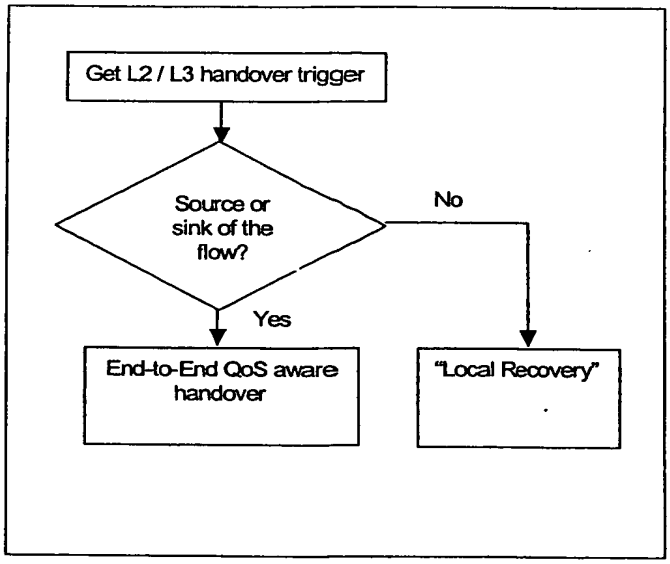

Get L2 / L3 handover trigger
Source or sink of the flow?
No
Yes
End-to-End QoS aware handover
"Local Recovery"

Fig. 22

2300

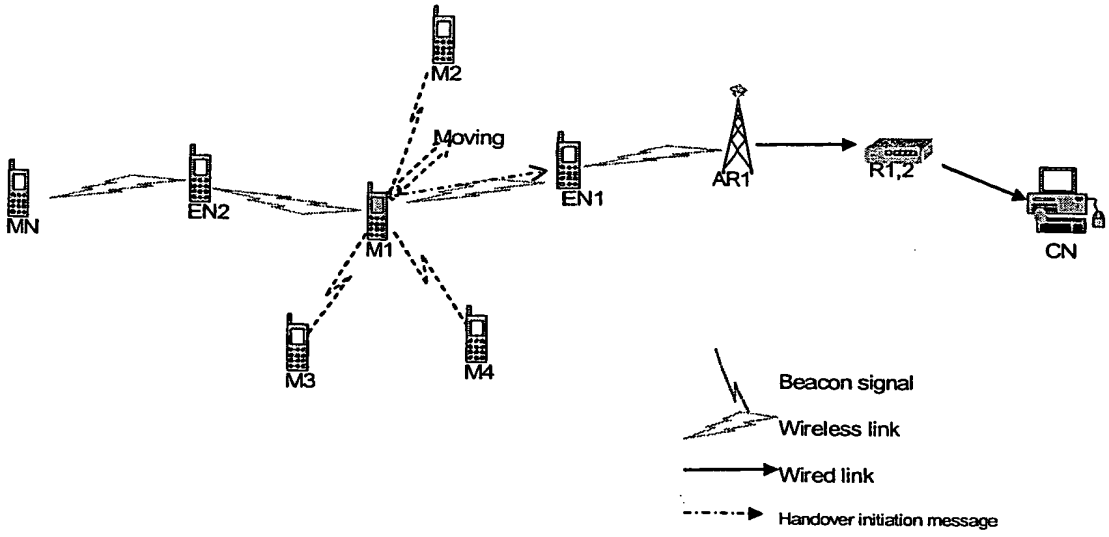

M2
Moving
MN
EN2
M1
EN1
AR1
R1,2
CN
M3
M4
Beacon signal
Wireless link
Wired link
Handover initiation message

Fig. 23

2400

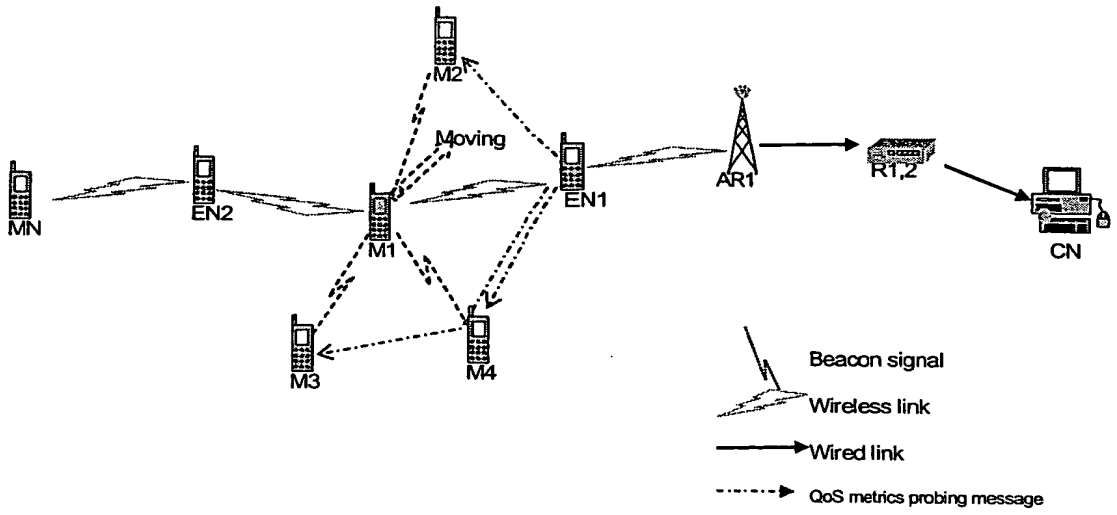

M2
Moving
MN
EN2
M1
EN1
AR1
R1,2
CN
M3
M4
Beacon signal
Wireless link
Wired link
QoS metrics probing message

Fig. 24

2500

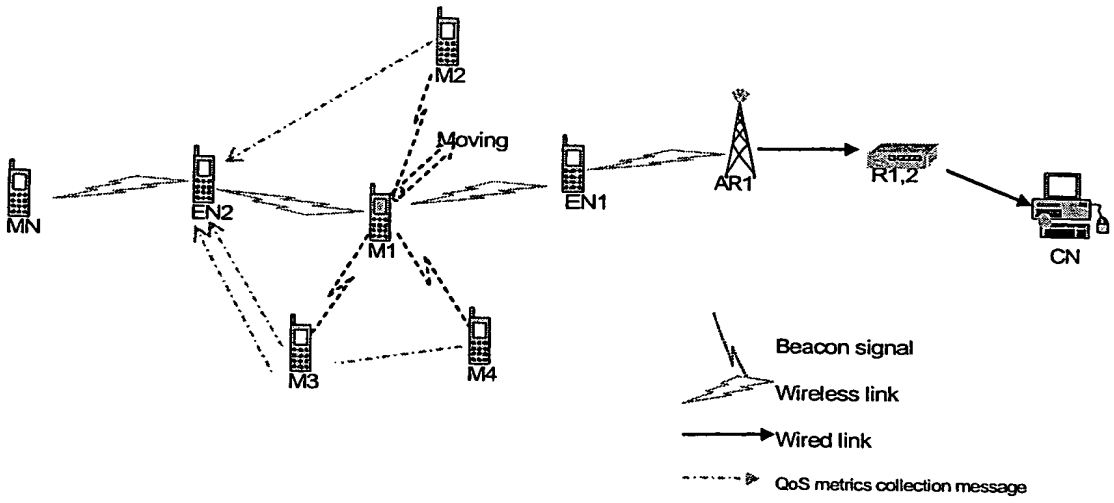

M2
Moving
MN
EN2
M1
EN1
AR1
R1,2
CN
M3
M4
Beacon signal
Wireless link
Wired link
QoS metrics collection message

Fig. 25

2600

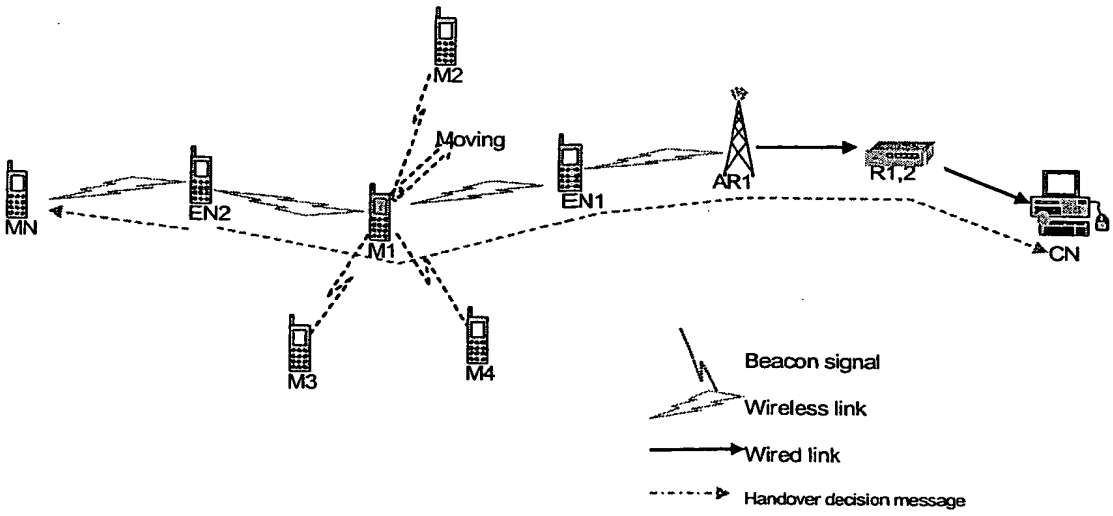

M2
Moving
MN
EN2
M1
EN1
AR1
R1,2
CN
M3
M4
Beacon signal
Wireless link
Wired link
Handover decision message

Fig. 26

2700

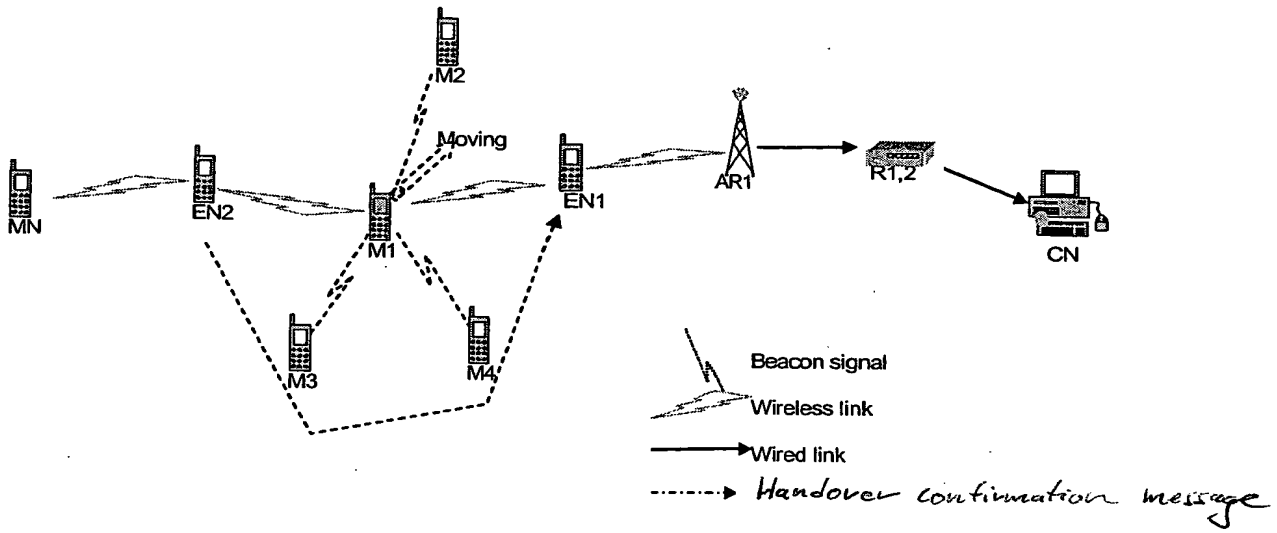

M2
Moving
MN
EN2
M1
EN1
AR1
R1,2
CN
M3
M4
Beacon signal
Wireless link
Wired link
Handover confirmation message

Fig. 27

2800

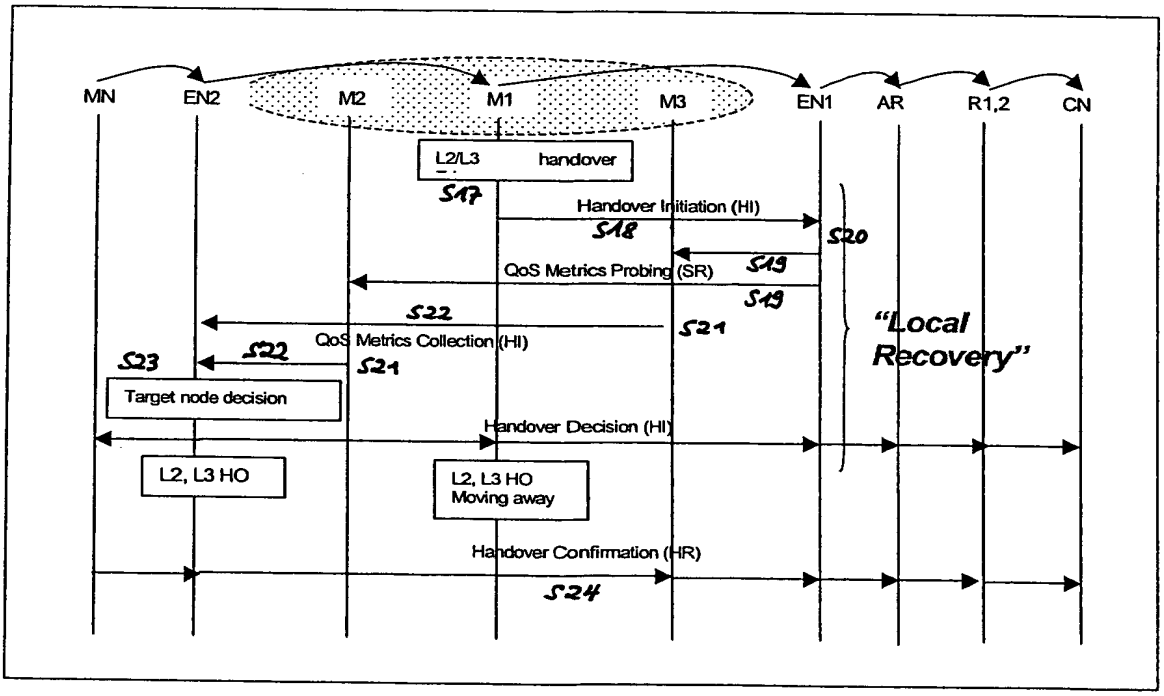

MN
EN2
M2
M1
M3
EN1
AR
R1,2
CN
L2/L3 handover
S17
Handover Initiation (HI)
S18
S20
QoS Metrics Probing (SR)
S19
S19
S22
S21
QoS Metrics Collection (HI)
S23
S22
S21
"Local Recovery"
Target node decision
Handover Decision (HI)
L2, L3 HO
L2, L3 HO
Moving away
Handover Confirmation (HR)
S24

Fig. 28

2900

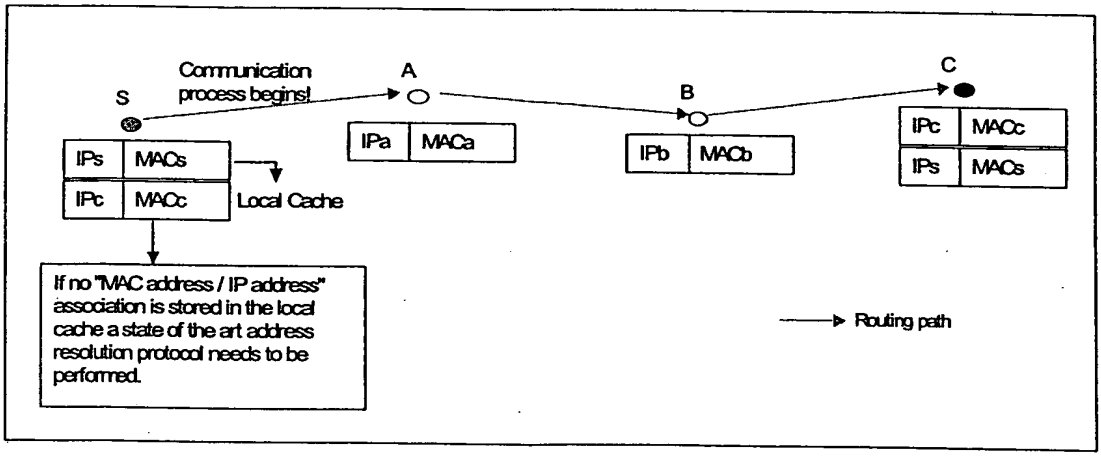

Communication process begins!
S
A
B
C
IPa
MACa
IPb
MACb
IPc
MACc
IPs
MACs
IPs
MACs
IPc
MACc
Local Cache
If no "MAC address / IP address" association is stored in the local cache a state of the art address resolution protocol needs to be performed.
Routing path

Fig. 29

3000

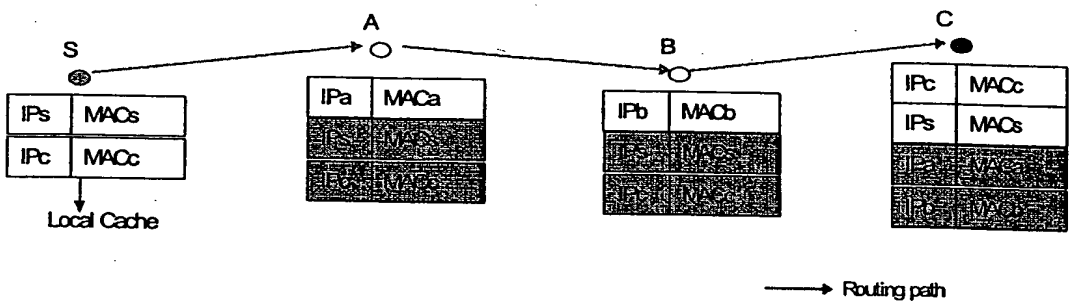

S
A
B
C
IPs
MACs
IPc
MACc
Local Cache
IPa
MACa
IPb
MACb
IPc
MACc
IPs
MACs
Routing path

Fig. 30

3100

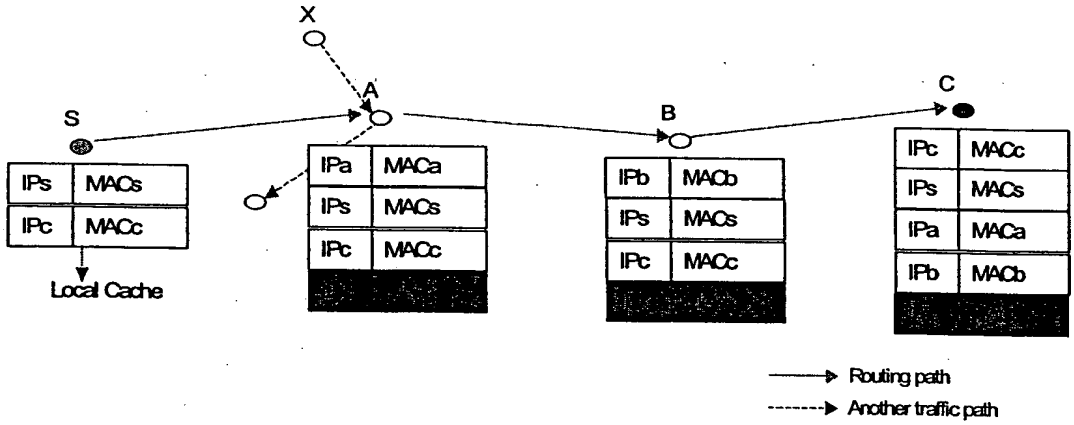

X
A
S
B
C
IPs
MACs
IPc
MACc
Local Cache
IPa
MACa
IPs
MACs
IPc
MACc
IPb
MACb
IPs
MACs
IPc
MACc
IPc
MACc
IPs
MACs
IPa
MACa
IPb
MACb
Routing path
Another traffic path

Fig. 31

3200

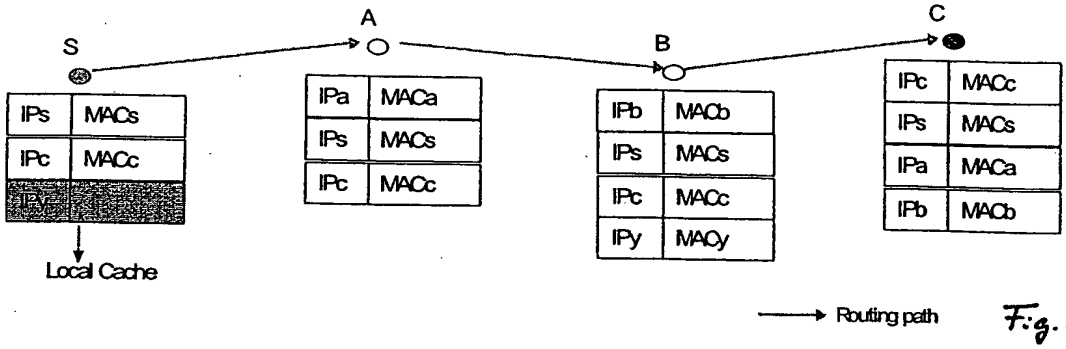


Fig. 32

3300

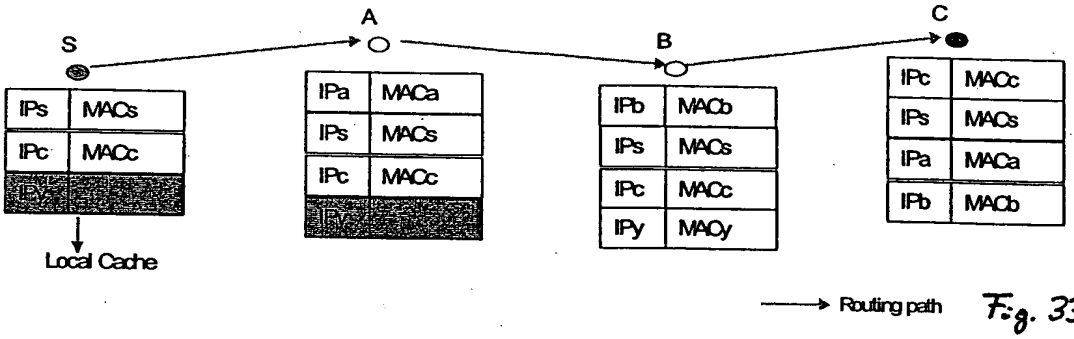


Fig. 33

3400

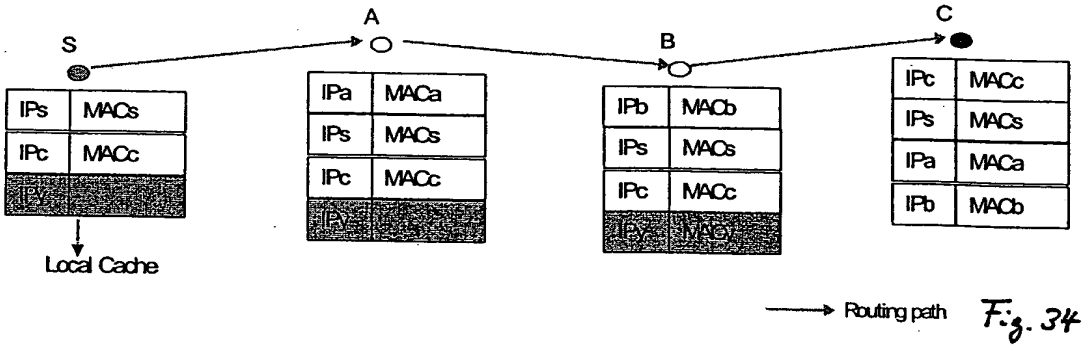


Fig. 34

3500

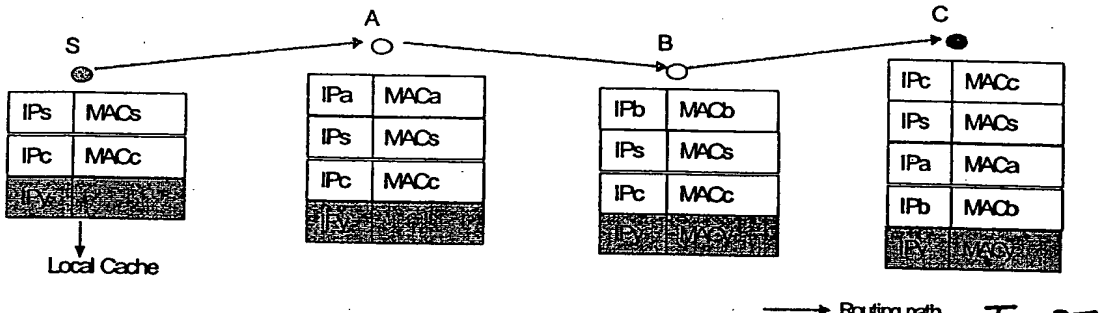


Fig. 35

3600

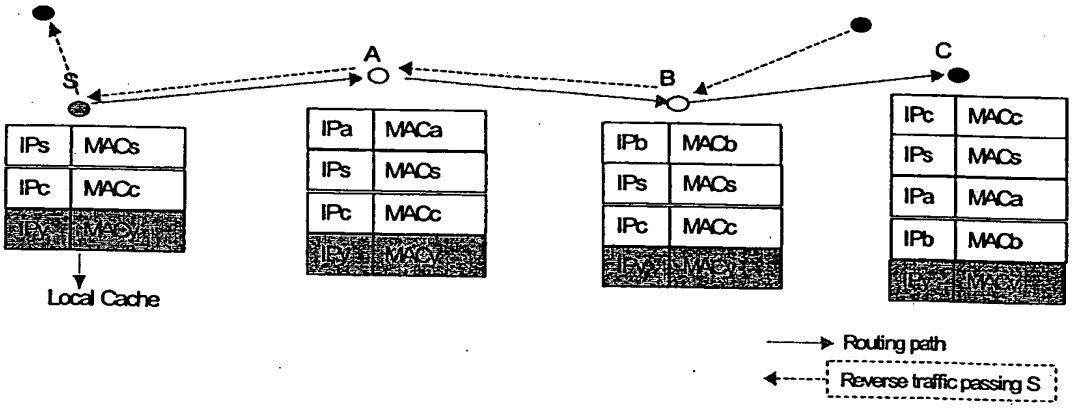


Fig. 36

3700

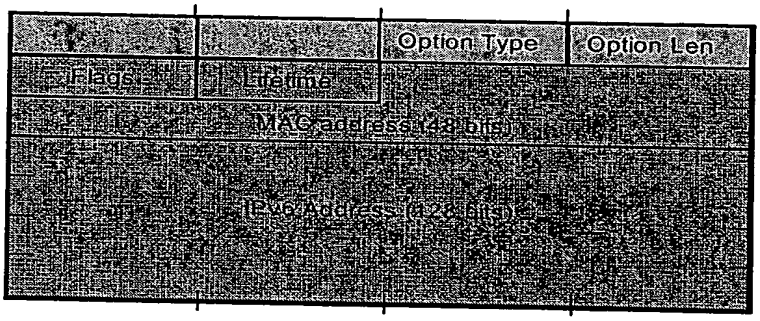

Option Type
Option Len
Flags
Lifetime
MAC address (48 bits)
IPv6 Address (128 bits)

Fig. 37